Radionuclide images were acquired in the LAO best septal projection, on a 64 × 64 pixels matrix. The examinations were performed within one hour and the results were blindly reviewed in two laboratories and compared by linear regression analysis. *Results:* mean EABD right ventricular FAC was 31 ± 6%; mean TAPSE 18 ± 4 mm and mean radionuclide RVEF 33 ± 5.

	r	SEE	p value
FAC vs. radionuclide RVEF	0.87	0.34	<0.0001
TAPSE vs. radionuclide RVEF	0.76	0.36	<0.0005

Conclusions: In patients with chronic heart failure, right ventricular function can be accurately estimated by on-line FAC generated by EABD. This method is more accurate than TAPSE. Compared with the radionuclide technique, the absence of radiation exposure and the real time display are potential advantages of ultrasound in the noninvasive assessment of right ventricular function.

949-118 Assessment of Right Atrial Pressure by Hepatic Vein Doppler Echocardiography: A Simultaneous Catheterization/Doppler Echocardiographic Study

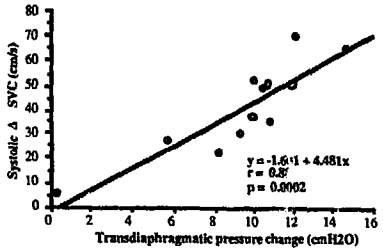
David G. Hurrell, John D. Symanski, Hari P. Chaliki, Kyle W. Klarich, Ross D. Pascoe, Rick A. Nishimura. *Mayo Clinic, Rochester, MN*

The non-invasive assessment of right ventricular systolic pressure from Doppler and tricuspid regurgitant velocity requires an accurate assumption of right atrial pressure (RAP). The 2D echo appearance of the inferior vena cava(IVC) has been used but may not reliably predict significant elevation of RAP. Therefore, 21 patients were studied in the cardiac catheterization laboratory comparing simultaneous RAP (measured at mid-systole) to on-line simultaneous Doppler recordings of the hepatic vein systolic (S) and atrial reversal(AR) velocities. The simultaneous IVC dimension was measured from 2D echo. There was a direct correlation of IVC dimension with RAP ($r = 0.64$; $P < 0.01$), but the sensitivity and specificity of the IVC ≥ 20 mm for a RAP ≥ 20 mmHg was 67% and 80% respectively. There was a significant inverse correlation of the(S-AR) velocity difference and RAP ($r = 0.74$; $P < 0.001$). A (S-AR) velocity difference < 0 cm/s was 94% sensitive and 100% specific for a RAP ≥ 20 mm Hg. *Conclusion:* The hepatic vein (S-AR) velocity difference is a sensitive and specific Doppler echocardiographic index for assessment of RAP and a better predictor of elevated RAP than the IVC diameter.

949-119 Respiratory Variation of Superior Vena Cava Doppler in Patients With Severe Emphysema: Correlation With Intrapleural and Intraabdominal Pressure.

Smonporn Boonyaratavej, Lyle J. Olson, Kenneth C. Beck, Catherine M. Swee, Jae K. Oh, James B. Seward. *Mayo Clinic, Rochester, MN*

In normal subjects, superior vena cava flow is augmented by inspiration. In pts with chronic obstructive lung disease, the magnitude of change of SVC forward flow velocity with respiration (ΔSVC) is reported to be increased. Since the patient with severe emphysema may also have abnormal diaphragmatic motion, we hypothesized that Δ SVC magnitude is related to transdiaphragmatic pressure change rather than intrapleural pressure change alone. *Methods:* Echocardiography with SVC Doppler was performed in emphysema pts who had intrapleural (Ppl) and intraabdominal (Pab) pressure measurement by balloon manometry. ΔSVC was correlated with changes in Ppl and Pab. Transdiaphragmatic pressure was defined as Pab – Ppl. *Results:* 12 pts (age 65 ± 5 yr, 7 M, 5 F) with severe emphysema (% FEV_1 20 ± 8) were studied. Mean ± SD of SVC systolic forward flow velocity (inspiration vs expiration) was 65 ± 17 vs 24 ± 10 cm/s. Diastolic forward flow velocity was 41 ± 12 vs 9 ± 12 cm/s. The correlation between Ppl and systolic or diastolic ΔSVC did not show statistical significance. However, systolic ΔSVC was highly correlated with transdiaphragmatic pressure change: $r = 0.88$, $p = 0.0002$, $R^2 = 0.77$ (figure).



Conclusion: In pts with emphysema transdiaphragmatic pressure is an important determinant of systolic ΔSVC. Therefore, diaphragmatic function must be taken into account in the interpretation of augmented systolic ΔSVC.

949-120 Echocardiographic Predictors of Exercise Capacity in Primary Pulmonary Hypertension

Alan L. Hinderliter, Park W. Willis IV, Shu Li, Gary Koch, Linda Clayton and the North American Primary Pulmonary Hypertension Study Group. *University of North Carolina, Chapel Hill, NC; Burroughs Wellcome Company, Research Triangle Park, NC*

Primary pulmonary hypertension (PPH) is associated with abnormalities in right heart structure and function which contribute to the morbidity and mortality of this disease. To assess the relation of cardiac abnormalities to exercise capacity in patients with severe PPH, we compared findings on two-dimensional and Doppler echocardiograms to results of a six-minute walk in patients with Class III or Class IV symptoms.

The 81 study subjects averaged 39 ± 3 years of age; 73% were female. All were treated with conventional medical therapy, including oral vasodilators if tolerated. The distance walked in six minutes was inversely correlated with the following: a) right ventricular diastolic area indexed by height ($r = -0.25$, $p < 0.04$), a measure of right ventricular size; b) diastolic eccentricity index ($r = -0.37$, $p < 0.001$), a measure of septal deformity which reflects the abnormal interaction between left and right ventricles; c) tricuspid regurgitation jet area ($r = -0.36$, $p < 0.001$), an estimate of the severity of tricuspid regurgitation; and d) pericardial effusion size ($r = -0.49$, $p < 0.001$).

In summary, in patients with severe PPH, poor exercise capacity is associated with right ventricular dilatation, an abnormal interaction between left and right ventricles, tricuspid regurgitation, and presence of a pericardial effusion. These findings suggest that abnormalities in right heart structure and function which can be measured by echocardiography are important determinants of exercise capacity in PPH.

949-121 Reconciliation of Doppler Predicted and Actual Pressure Gradients in Modified Blalock-Taussig Shunts

Theresa A. Tacy, Kevin K. Whitehead, Edward G. Cape. *Cardiac Dynamics Laboratory, Children's Hospital of Pittsburgh, PA*

Accurate knowledge of the pressure gradient (PG) across a modified Blalock-Taussig shunt (BTS) is critical in surgical planning for staging to a cavopulmonary anastomosis. While it is common to estimate the aortopulmonary pressure gradient (PG) using the modified Bernoulli equation (MBE), the accuracy of this technique is limited due to viscous energy losses in the BTS which are unaccounted for in the MBE. *Methods:* We studied the relationship between PG predicted by MBE and aortopulmonary PG using a pulsatile flow model with Gore-Tex BTS connecting systemic and pulmonary circuits with variable compliance and resistance to generate 5 peak PG's, 20–100 mmHg, and a range of mean PG from 5–88 mmHg. Effect of BTS length (L) and diameter (D) were investigated by varying L from 3 to 9 cm and D from 4 to 6 mm. The velocity (v) of the blood analog fluid within each BTS was measured by continuous wave Doppler for each condition, and the MBE was tested as a predictor of the PG across the BTS. An equation for peak PG was derived using established formulae for fluid contraction into a tube, $PG = 1/2\ \rho v^2\ [1.5 + fL/D]$, which incorporates a Reynolds number-dependent friction factor f. *Results:* The slope of the regression line ($y = 0.80x$, $r = 0.97$) reflected the tendency for underestimation of peak PG by MBE and was significantly different from unity ($p = 0.01$). The average error was 21% for all BTS and flow conditions ($r = 0.97$). The mean PG predicted by the MBE also significantly underestimated the mean tranducer PG, with an average underestimation of 24% ($y = 0.74x$, $r = 0.98$). Using the f equation, the mean error of peak PG decreased to 5%, and the slope of the regression line relating Doppler predicted to PG ($y = 1.04x$;) was not significantly different from the line of unity ($p > 0.05$). *Conclusions:* The MBE should be applied to BTS with caution because of its consistent underestimation of PG. Application of fluid dynamic theory may yield a truly accurate predictor of PG across BTS which is critical in surgical decision making.

949-122 Dynamic Elastic Properties of Ascending Aorta in Coronary Artery Disease Evaluated by Dobutamine Stress Echocardiography

George Athanassopoulos, Eleftherios Glazitzoglou, Demetrios Avramides, Athanassios Maginas, Vassilios Voudris, Dennis V. Cokkinos. *Cardiology Department, Onassis Cardiac Center, Athens, Greece*

Aortic distensibility is decreased in coronary artery disease (CAD) at rest. However its dynamic changes during dobutamine infusion and the implications for the relevant ventriculo-arterial coupling have not been clarified.

Forty CAD patients (10 with 1, 12 with 2 and 18 with 3 vessel disease-VD, age 58 ± 12) and 10 normals were studied during low dose dobutamine

TUESDAY POSTER